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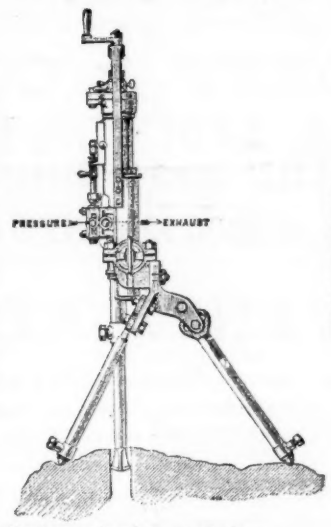

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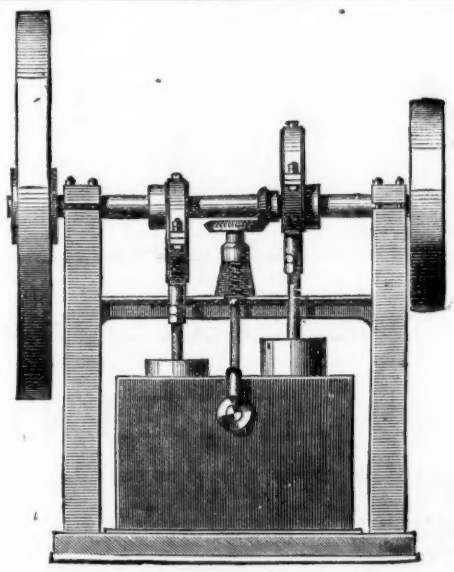

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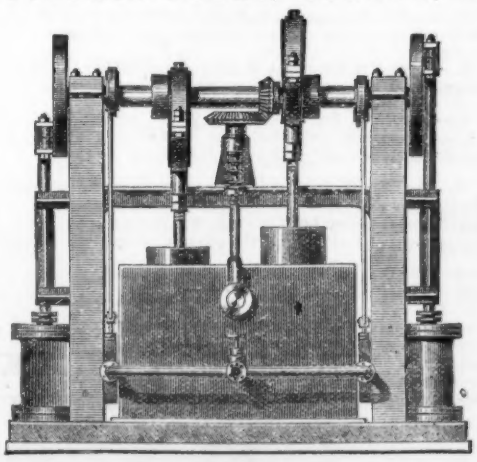

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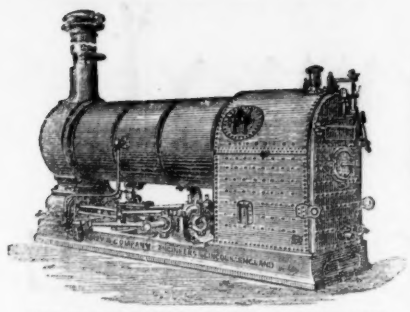

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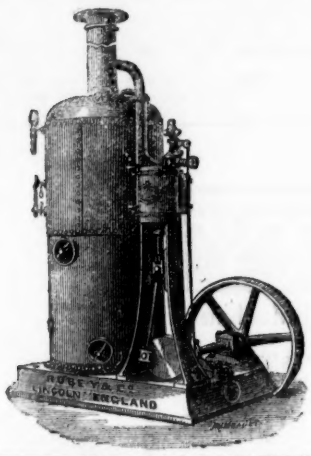

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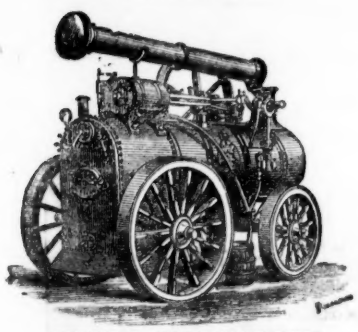

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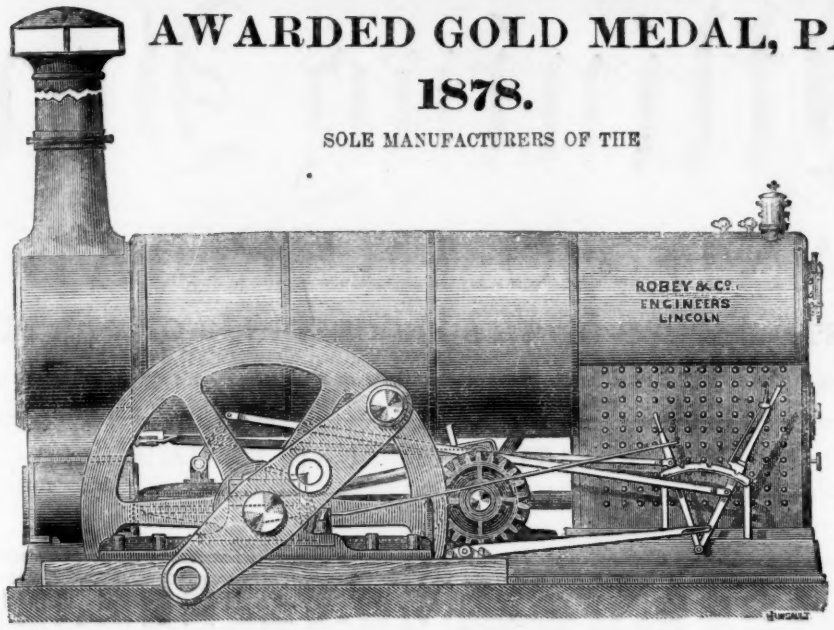

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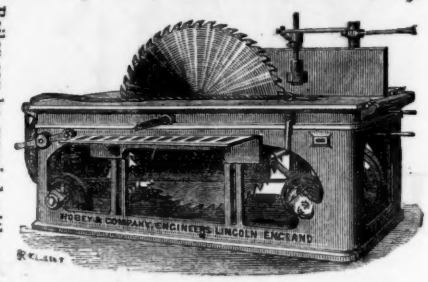

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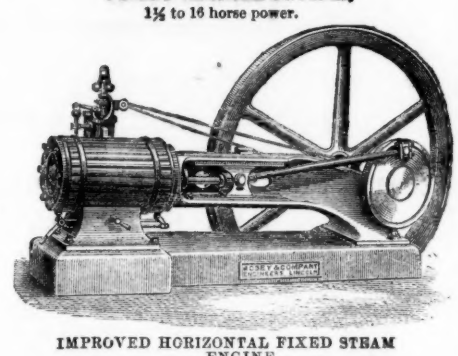

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As a still greater improvement, we beg to submit our Wrought-iron Drums (Rodgers's Patent), on which we are the Sole Makers. Their special merits may be briefly stated as follows:—

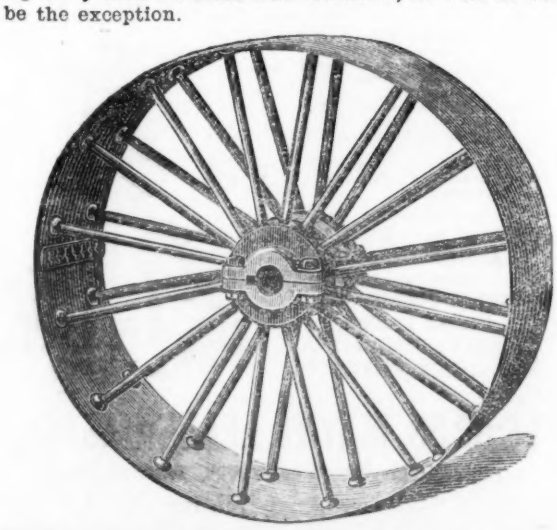
1.—These drums absorb less of the power of the engine in friction than any other mode of driving.

2.—Leather belts on these drums will drive considerably more than cast-iron ones, and the belts last much longer.

3.—These drums are not only considerably lighter in the larger sizes, but also infinitely stronger than cast-iron ones.

4.—In case of fire they suffer little damage. We have repaired many hundreds that have been in very serious fires, generally at about 25 per cent. on first cost.

5.—For MAIN DRIVING purposes they are invaluable, especially in case of a new mill, as they do not require such substantial and heavy building construction as is necessary in ordinary cases to withstand the constant vibration of gearing.



6.—The wrought-iron drums and belts are more easily and quickly fixed than gearing.

7.—Greater economy in steam power, as it requires less power to transmit the same effective force with belts than it does with gearing.

8.—Very much greater economy in subsequent repairs, as compared with gearing.

9.—The power is transmitted evenly, faithfully, and noiselessly, and without the vibration arising from defective or worn gearing.

10.—They require no cases for transport or shipment.

In support of the foregoing statements, we may say we have already supplied upwards of 20,000 of these Drums for use in Great Britain and Ireland, and have also exported them largely throughout the Continent of Europe, India, and the British Colonies.

These Drums being made by special machinery, can be made any diameter up to 24 feet, and also any width up to 4 feet, and to fit any size of shaft.

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Original Correspondence.

ON HAULING COAL UNDERGROUND—No. III.

SIR,—Having described in my letter of last week the locomotive system of conveying coal, as recently introduced in the Herrington and Dorothea Mines in the Maudlin seam, we proceed now to the other systems of mechanical haulage at work in the same seam—that by endless chain with and without engine power, and that by engines with main and tail ropes.

An endless chain is in operation in the Herrington Mine on a length of 300 yards, conveying the coal in an east direction, and landing it at the bottom of the pit. There is a falling gradient to the pit varying from 1 in. to 4½ in. in a yard. The chain speed is three or more miles per hour. There are, of course, two roads, and the chain is self-acting, the full tubs more than overbalancing the empty tubs. The system would self-act if extended to a much greater length on the level, and, in fact, in this instance is capable of doing great work by extension on an easy rise. The tubs are placed 20 yards apart. The chain is of ⅝-in. iron; it goes half round the sheave at each end; each sheave is 6 ft. in. diameter; wood cleading is inserted, on which the chain turns without slipping. There is only one curve or turn, which occurs about the middle of the incline; at this point two rollers are fixed between the roof and the floor; one is placed at the side of each line of rails just so as to allow the tubs to pass it; the chain bears against these rollers, causing them to revolve, and thus the chain on the respective sides is changed in the direction of its movement.

Another endless chain is in operation in the Dorothea Mine. The coal is conveyed in a north direction, and is landed near the bottom of the pit; this is 700 yards in length. The first 300 yards from the pit rises considerably; the next 400 yards is nearly level. The first section of 300 yards commenced 13 years ago, and was self-acting. The system having subsequently been lengthened to 700 yards in all, it is no longer self-acting, but requires engine power in addition to the gravity of the load. The engine for driving the chain has two 8-in. vertical cylinders, 12 in. stroke; it is put in and out of gear by a friction cone, and geared by bevil wheels in the ratio of 1 to 9. The chain speed is about three miles per hour; the tubs are placed 20 yards apart; the chain is ½-in. iron. In this instance the whole of the engine power is demanded to work the chain and load. A change has lately been made in the form of the tubs run on this length; instead of 12-in. wheels the tubs now used are fitted with 7-in. wheels, and this slight variation requires almost more power than can be obtained from the engine.

The third system of underground haulage is that by an engine with main and tail ropes in the Herrington Mine. The engine is placed on the surface; it was first used as the sinking engine for the downcast pit, and since the completion of the sinking, three years ago, has been utilised for hauling. It has two 13-in. horizontal cylinders; two 4-ft. drums, placed side by side, geared in the ratio of 1 to 4. The drums are put in and out of gear by clutches. The engine-plane goes direct south from the pit, a length of about 1¼ mile. There is a branch of great length to the east, and another branch to the west of considerable length, both branches making a junction with the south plane about half-way in. The south plane being nearly level is worked the whole way in each direction by main and tail ropes respectively. At the east way junction the tail rope is disconnected, and the empty sets run in by gravity with the main rope to the extremity of the east way, and also to three branches on the north and south sides. The main rope pulls the full sets out from the several stations to the junction, where the tail rope is again attached, and the sets are started again to be drawn to the pit. The west branch, having a considerable rise inwards, the tail rope only is used in pulling the empty tubs in to the extremity, the main rope being disconnected at the junction. After the full sets are lowered down by the gravity of the plane with the tail rope to the junction, the main rope is again attached, and the sets are hauled out by it to the pit.

In this system of hauling only one line of rails is required; there is thus a saving in first cost as compared with the endless chain system, and with main and tail ropes the main road and branches may be extended at pleasure as the workings are advanced. The conveyance of coal is done expeditiously. The friction of the ropes in planes of considerable length is very great, more especially if there are a multitude of curves and turns in the road, as we often find in engine planes generally. As much as 75 per cent. of the engine power in extreme cases is expended on the friction and working of the ropes. With the principle of the endless chain there is a system of counterbalancing at work throughout. The west way full sets in this instance would balance the full sets to be drawn out of the east way, and the empty sets operate in a like manner. The working of the whole system is thus performed with the minimum of engine power.

Having given the details of the air compressors at the surface, at Herrington Colliery, we now give the particulars of the other engines erected there. The winding engine was erected by Murray and Co., in 1874. It is of the vertical lever construction, with one cylinder 54 in. in diameter, 7 ft. stroke, non-condensing 45 lbs. steam pressure, direct acting, plain drum for round ropes 18 ft. in diameter. The drum and shaft are supported at one side on the wall of the engine house, at the other side by a wrought-iron girder and struts of great strength, which rest on the front and back walls. The levers are also of wrought-iron. Notwithstanding the great height of the pulley frame—74 ft.—the winding ropes run almost on a level from the drum to the pulleys. This engine is not counterbalanced. The cages carry each six tubs of 8½ cwts. capacity, in two decks. Each cage is of steel, and weighs about 55 cwts.

The pumping engine is placed near the top of the upcast pit. Little water was met with in sinking below the depth of 52 fms. A large feeder was encountered at this depth, which was raised by the present engine with 18-in pumps in two lifts, a bucket and a forcing lift. The engine is one of Hathorn, Davy, and Co.'s compound condensing horizontal engines, with differential gear. The diameters of the high-pressure and low-pressure cylinders are 27½ and 44 in. respectively, stroke 5 ft. The engine works direct to two quadrants, by which the water is raised from the feeder at 52 fms. depth, in two lifts—the lower a bucket lift, 12 in. diameter, from one quadrant, the upper a forcing lift, 10 in. diameter, by the other quadrant. The water is forced 12 fms. above the surface to a tank on the top of the winding engine house, depth of tank 4½ ft. The pumps are now placed, not in the pit, but in a staple adjacent to the pit, which was sunk specially for this purpose. The engine works six strokes per minute, day and night. From this tank water is supplied to the villages of New Herrington, Philadelphia, Burn Moor, &c., and also to Lambton Castle, about three miles distance from the engine. There are twelve coal screens at Herrington Colliery, constructed wholly of wrought-iron; the inclination of the screens is in opposite directions alternately; the breadth of each is 5 feet, so that the breadth of the whole range is 60 feet. The rough small coal falling through these screens is run into a horizontal tube at the bottom of each range of screens in which a spiral is placed, the length being 60 ft. At one end of each tube an engine is fixed to turn the spiral; each engine has one 8 in. vertical cylinder, geared 1 to 3. At the other end of the horizontal tubes the coal is discharged into a hopper, from whence it is raised by an inclined apparatus called a "beeswing," one full tub ascends while the empty descends. The apparatus is not worked by the winding engine—as is usual in this county—but by an independent engine, placed under the screens; this engine has two 10 in. horizontal cylinders, and is geared in the ratio of 1 to 3.

The whole of these engines are supplied with steam at 45 lbs. pressure per square inch from seven double-flued boilers, 7½ ft. in diameter, each flue having several cross tubes inserted in it. The boilers are fed with a Cameron engine, having two 10-in. steam cylinders and two rams.

At the Dorothea Colliery, where a large quantity of coal is raised, there are two winding-engines in operation. One draws coal from the Maudlin seam, about 100 fms. in depth, in cages, each of which contain three tubs in three decks. This engine has two 25-in. horizontal cylinders, 5 ft. stroke, direct-acting, plain drum, and round ropes, was built by A. Barclay, of Kilmarnock. The second winding-engine is a beam engine of a very old-fashioned type; it raises coal from the Five-quarter seam a slighter depth, and also pumps water in the night time from the same depth. About 700 tons of coal is raised here in a day of 10 hours. M. E.

THE FURNACE CHEMISTRY OF IRON AND STEEL.

SIR,—However much we may vaunt ourselves on the increase of our knowledge of technological processes during this decade, we must be constrained to admit that such knowledge is chiefly of wet or low temperature reactions. High temperature or furnace chemistry has been but little studied, and to-day the only reliable information on furnace chemistry is to be found in the valuable Transactions of the Iron and Steel Institute, and in the no less valuable works of Percy, Bell, Akermann, Tunner, and Grüner, besides the few isolated memoirs of various technologists, English, American, French, and German.

However profound may be one's knowledge of low temperature processes, it must by no means be assumed that one is, therefore, an authority on dry, high temperature, or furnace chemistry; since at high temperatures some reactions are precisely the reverse of those which take place at a lower heat. Instance hydrogen and oxygen, or carbonic acid and spongy iron; or, further, that notable outcome of a careful study of the reactions between phosphorus, iron, and lime at temperatures above the melting point of cast-iron, wherein Snelus, Bell, Stead, Thomas, Gilchrist, and Riley have taken prominent parts. No amount of study or experiment on the chemistry of phosphorus in the cold could ever have advanced one single iota our knowledge of the behaviour of these bodies at high temperatures.

Nowadays the science of chemistry is too vast to allow any man, without presumption, to call himself a chemist, pure and simple; he must say what branch of chemistry he professes special knowledge of. You will doubtless call to mind the man of science who disclaimed for himself the title of entomologist, or even that of coleopterist, but modestly hoped to prove himself worthy of the appellation of "Scarabeeist;" so it should be with chemists to day. One man may have special knowledge in the chemistry of iron and steel, another in copper or lead, and another in the abstruse field of the chemistry of the carbon compounds, but no one has a right to describe himself as an "all-round" chemist. Life is too short, the progress of science too rapid, and the world too narrow to permit of the existence of such a phenomenon. This being so I have purposely abstained from pronouncing any opinion in your Journal as to the merits or demerits of the process for extracting copper from pyrites, as patented by Mr. John Hollway, since I can only judge of it in those points wherein it approximates to the working of iron or steel, either as regards plant or refractory linings. On these points I may venture to say that as a practical metallurgist I fail to see any insuperable difficulties which can prevent him from rendering his process a commercial success.

Although Mr. Hollway now appears before the world as the distinguished inventor of a process for extracting copper from pyrites without the aid of extraneous fuel, I would venture to remind your readers (as your correspondent "A. P. L." did last week) that he has taken out numerous patents relating to iron and steel, and though they may be possessed of less brilliance than his last invention, still they are, to say the least of them, the results of a thoughtful and earnest study of the furnace chemistry of iron and steel.

Mr. Hollway's first patents were for the manufacture and smelting of "metallic coke," wherein he proposed to mix with certain proportions of bituminous material pulverulent ores of iron, manganese, titanium, &c., and to manufacture a sound coke therefrom. I need scarcely remind you that such pulverulent ores occur in large quantities in Nature, as witness the specular ores of Elba, the magnetic sands of New Zealand, and many others, and the bye product known as "blue billy." Such ores are, as a rule, rich in iron, and their adaptability for smelting in the blast furnace is very limited, as it is impossible in practice to exceed (say) 20 per cent. of the total charge of minerals, flux, and fuel. But by Mr. Hollway's plan a very much larger proportion can be used, in fact has been used, in blast furnaces, and on a large scale. And herein, from the first, Mr. Hollway has in this important respect differed from the ordinary run of inventors in that his experiments have, as a rule, been made on the large or working scale, and that every product has been rigidly analysed. In this case many hundreds of tons of metallic coke were made, with such additions as small manganiferous and titanic ores, and blue billy. The patentee had the courage of his belief to put in the blast furnace, at his own risk, large quantities of such coke. Experiments on this large scale were made at the blast furnaces of Messrs. John Brown and Co. (Limited), Bolckow, Vaughan, and Co. (Limited), Sir W. Armstrong and Co., and the Phœnix Company, Westphalia. In every case the truth of the idea was fully justified, but he was everywhere baffled by that arch-enemy of inventors—cost. In my opinion this process is not dead, it only sleeps. I feel assured that when the long-looked-for revival in the iron trade arrives, and prices assume a normal level, that in some localities and with some ores this process will prove to be of commercial value. Be that as it may, the conduct of these experiments on the large scale elicited some intensely interesting and valuable facts in the metallurgy of iron, manganese, and silicon.

Leaving the blast furnace, Mr. Hollway was, I fear, somewhat dazzled with the glare of the Bessemer process. He took out sundry patents for the manufacture of solid steel castings, and for the dephosphorisation of iron, wherein he proposed to use silicides, carbides, carbon oxide of iron, and basic linings, and to reinstate carbon to restore fluidity to the bath of molten iron. I have all along insisted that he was misled by an exaggerated notion of the temperature and duration of the liquidity of molten steel. Were it possible to deal with molten metal as he wished, and to keep it molten without difficulty, in spite of chilling additions, such as oxide of iron, then he might have succeeded, but practical men know too well, and to their sorrow, how soon molten metal of any sort commences to solidify.

Being, as I suspect, thoroughly convinced of this fact, Mr. Hollway turned his attention to the prevention of solidification, or cooling, and his next invention was for the maintenance of a melting heat by burning the carbonic oxide generated during the blowing, in the converter itself, by means of a separate range of tuyeres. This is the process so aptly described by your correspondent "A. P. L." last week; and he also, as "A. P. L." further describes, patented a method of smelting silicious slags by means of an initial bath of pig-iron, and subsequent addition of metallic coke, iron ore, and fluxes. Neither of these processes has as yet been proved to be practically or commercially successful, yet they are like all the inventions of this singular patentee, possessed of so much merit, and based upon so profound a knowledge of chemical reactions at high temperatures, that it is simply idle to either approve or condemn.

In these steel patents the chemistry of phosphorus elimination is more than foreshadowed, and the success of the Thomas-Gilchrist process can be more readily understood by a careful study of Mr. Hollway's specifications. His copper process, again, is but a further outcome of his grasp of Bessemer's idea of the rapid oxidation of materials containing within themselves a proper proportion of combustible matter, assisted or not by initial heat. As to the merits of this process, I have already declared my inability to form a decisive opinion from a copper smelter's point of view, but, as I have pointed out, such practical details as are analogous to those of the Bessemer process do not appear to me to be invested with any difficulties greater than such as iron and steel metallurgists have already grappled with and overcome.

It is an old saying that "outsiders see most of the game." In the case of inventors this is indubitably true, as metallurgists know so well the difficulties of even their ordinary processes; and, moreover, having always that bugbear "prime cost" before their eyes, are simply afraid to launch out in what they may consider fanciful inventions. Outsiders, free from the prejudices and traditions of the craft step in, experiment, and succeed (sometimes). I do not care to quote that apposite proverb, but feel compelled to do so, as it alone can describe the situation—"Fools rush in where angels fear to tread." But in case of success, the first and fifth words are read just the contrary. I am sure that all your practical readers will agree with me that most of our great metallurgical revolutions have been initiated by outsiders—witness Neilson, a gasworks manager; Bessemer, a bronze manufacturer; Siemens, an electrician; and Hollway, a London merchant.

The utilisation of ferriferous slags appears to me to be a point upon which some light may with advantage be thrown. It is, of course, known to your readers that orthosilicate slags, containing (say) 50 per cent. of metal, and a content of silica up to 30 per cent., are smelted in the blast-furnace on a very large scale. At the low price at which such slags are sold there is no question as to the economy of smelting them, but their high content of phosphorus renders iron made from them at present useless for steel making. The slag Mr. Hollway makes in his copper smelting process will, as is obvious from the published analyses, be free enough from that objectionable element to make iron fit for the present process of steel manufacture.

Although such slags are readily reducible in the blast-furnace, it is an open question with me as to whether they are reduced by carbonic oxide gas or by intimate contact with solid carbon. They differ from ordinary iron ores, as that they are easily fusible silicates; and, moreover, the iron they contain exists as protoxide (FeO); this oxide is invariably more refractory than the peroxide (Fe_2O_3). Hence in districts such as South Staffordshire, where large quantities of these slags are smelted, an ancient custom of calcining them obtains, by which the protoxide presumably becomes converted into peroxide; at any rate, the substance becomes more porous, and consequently more permeable to the reducing gases of the blast-furnace. This process of calcination is, I may add, found to be advantageous in the case of ores containing the magnetic oxide (Fe_3O_4), and for both reasons—sponginess and peroxidation.

Another difficulty in using the raw slags in the blast-furnace is that owing to their ready fusibility they (to use a technical term) "outrun the load," and are apt to come down to the tuyeres before the minerals there are ready for them. This difficulty is got over by a suitable adjustment of the charge. I believe that in these days ironmasters are sufficiently awake to their own interests to avoid throwing away as rubbish any waste product which is rich enough to smelt; but there must always be a large quantity of waste products made, which are too poor to recover. A cheaper process of dealing with these would be heartily welcomed, and it remains with Mr. Hollway to prove that his slag processes will pay better than the blast furnace. Many such direct processes have been suggested, but I think we may rest assured that the stately form of the blast-furnace will continue to adorn certain localities long after the present generation of metallurgists have gone "out of blast."

Before I conclude I would point out that "A. P. L." is in error when he states that carbonic oxide burning above the molten iron exercises a reducing action. This is not so, as the product of such combustion, carbonic acid, exercises a powerful oxidising action on iron at such temperatures. Such combustion acts simply as a source of heat.

Mr. Hollway, as well as "A. P. L.," errs in supposing that it is feasible to run off slag from the Bessemer converter when it is desired, the form of the vessel being such that it is almost impossible to effect this. An important modification in the shape of the vessel will be necessary before this can be satisfactorily effected.

In conclusion, permit me to say that a careful study of Mr. Hollway's specifications, in conjunction with the information already before the world in the Transactions of the Iron and Steel Institute, and other works already named, will give to the student of the metallurgy of iron and steel the best and most reliable information on the furnace chemistry of iron at present obtainable. This subject is sadly ignored by the present standard works on chemistry.

Sheffield, June 9. THOMAS BLAIR.

A NEW PROCESS IN METALLURGY.

SIR,—Adverting to Mr. John Hollway's letter, which appeared in the Supplement to last week's Journal, I regret to say that a clerical error occurred in the particulars of my analysis of the crude sulphur which it is desirable should be corrected.

After alumina it should read thus—

Oxygen traces carbon and loss	8·13

Instead of—

Oxygen	trace
Carbon and loss	8·13

Swansea, June 12. JAS. S. MERRY (*not* J. T. MERRY).

MANUFACTURE OF IRON AND STEEL.

SIR,—Your correspondent, "A. P. L," has referred to the utilisation of the ferriferous slag produced in the Hollway Process.

It is well known that by Henderson's wet process for the extraction of copper from pyrites, oxide of iron—"purple ore" or "blue billy"—is obtained, containing over 60 per cent. of metallic iron.

Some of our critics have pointed out that one of the defects of my process is that the iron contained in the pyrites will be lost, or, at any rate, will not be of equal value to the blue billy obtained by the wet process. As I am of a different opinion I think I cannot do better than give the following extract, which I wrote to a friend at St. Helen's, on the 28th ultimo:—

"THE VALUE OF THE SLAG.—I do not agree with you on this subject. If you will enquire at any ironworks you will find that a slag containing 50 per cent. of iron and about 28 per cent. of silica, and free from phosphorus, is worth at least 5s. per ton, and this is, as you say, the present value of blue billy, which contains 60 per cent. of iron. A slag containing 33 per cent. of iron, 37 per cent. silica, and 30 per cent. lime or other bases would also be worth at least 5s. per ton—because, although poorer in iron, it would be a slag that could be smelted alone, whereas a slag containing 50 per cent. of iron and 28 per cent. of silica requires the addition of lime or other bases to smelt it. The slag produced by my process would have a very much higher value, because it would be at a temperature of about 1000° C., and the iron could be obtained therefrom while still in the liquid state—thus economising fuel, for example. The molten slag could be run directly in a Ponsard furnace lined with carbon—patent fuel—and the necessary bases added. Provided the mass is kept at a sufficient temperature the carbon in contact with the slag will reduce the iron therefrom, and the rapidity of the operation could be increased by blowing in coal dust or hydro-carbons. I dare say you will reply this is all very well on paper. The theory, however, is absolutely correct, and you can prove this by simply melting some of the slag in a graphite crucible, when part of the iron will be reduced, and, if the necessary bases are added and your graphite pot is thick enough, you can thus reduce the whole of the iron from the slag."—*London, June 9.* JOHN HOLLWAY.

CALORIC ENGINES.

SIR,—Where a very small amount of power is required caloric engines would appear to have the great advantage over other classes of engines, from the fact of their requiring no boiler, and it may also be said that they are much more easily managed. The engines of Ericsson, Schwartzkopff, and Roper have aimed at superseding steam engines, but this I think is a mistake; caloric engines have a field of their own. For some time past the name of Mr. Watt Boulton, of Tew Park, Oxfordshire, has been constantly heard in connection with these engines, and he has now made some further improvements which promise success. The engine consists of a heating vessel in which air or elastic fluid is heated. A cylinder fitted with a piston which drives the engine, and a chamber in constant communication with the cylinder, within which an instrument works, creating a current of air or of elastic fluid. This chamber and the air or fluid within it is alternately heated and cooled, and he calls it the alternator. He considers it best that the instrument working within it should be a rotary one, and he speaks of it as the fan. In connection with the above-named vessels are passages governed by valves, so that the current created by the fan can be variously directed.

With regard to the operation of the engine it will readily be understood when it is stated that the fluid having performed work the circulation or current caused by the fan is directed in such a way as to produce cooling action, so that the cylinder and alternator are filled with cold fluid, and the metal surfaces in contact with this are

cooled. In the next stage the piston compresses the fluid, and meanwhile circulation is directed through the cylinder and alternator. A considerable portion of the heat of compression is imparted to the metal in contact with the circulating fluid, and is stored in this metal. This abstraction of the heat of compression lightens the task imposed on the engine during this stage. In the next stage the circulation is directed so as to produce heating effect, and the temperature both of fluid and metal is raised to its maximum. Finally, in the fourth stage, expansion of the fluid takes place, and meanwhile the circulation is again directed through the cylinder and alternator. A large portion of the heat of the metal is imparted to the expanding fluid, and so utilised in producing motive power. This stage continues till the fluid has expanded so far as is judged useful. These four stages fill up the round of operations, and are surely as simply as need be.—*June* 9. MOTOR.

IS IT RIGHT TO PAY ANY PURCHASE-MONEY FOR MINES?

SIR,—Mons. Alphonse Léon charges me with great weakness in judgment in evading the questions which were put to me. If Mons. Léon had carefully read my letter he would have seen that I did not evade the questions put to me by Mr. Hoskold; but that I simply declined to discuss them, as they had nothing to do with the subject I have attempted to elucidate. My contention was that it is right to pay a purchase-money for mines if the value justified a purchaser in doing so as a commercial transaction, and I gave several illustrations which have not been questioned by any of the correspondents who have given their names to their letters. What amount should be given in the case of any particular mine I have not discussed at all, as I am decidedly of opinion that no general principle of value could be laid down which would enable any intending purchaser to decide what he should give in any particular case, as the value of every mine will be dependent on its own special features. So far there has been a general agreement with my views on the question I raised—notably in those cases given by Mr. Stuart. Mons. Léon does not advance any opinion in opposition to mine on the general question, but I infer he agrees with me. Do not mix the two questions; but, if Mr. Hoskold or Mons. Léon wish to bring forward the other question, let them do so by all means in any form they like. I, for one, do not see much advantage, if any, to be gained by its discussion; but that is a matter of opinion, and I presume not to dictate what others should do who differ from me.

I had intended not to write any more on the subject; but it is only courteous, perhaps, to Mons. Léon thus briefly to acknowledge his letter, and to express my gratification that French engineers are so much interested in the subject which I have discussed, as well as in the other which I have not argued, for the reasons I have several times given.

The letter signed "F. G. S." was mine; I had forgotten when I referred Mr. Hoskold to it that it did not bear my name. The letter signed William Johnson is also mine. How the mistake occurred I know not; but I assumed everyone who read it would at once see the error. I had hoped you might have corrected the error the week after it appeared; and I am now sorry I did not write at once, and ask for the correction. Let me say it was purely an error, whether mine or the printer's I know not; but there was no intention to mislead.—*June* 5. WILLIAM SALMON.

IS IT RIGHT TO PAY ANY PURCHASE-MONEY FOR MINES?

SIR,—If Mr. E. Erwen is capable why does he not write something calculated to instruct and inform us, and not treat us to those absurdities which may be expected from a novice only, and not from a person who desires us to believe in his great experience. I decline to follow him in his wanderings, and should not notice his letter at all were it not for the gross effrontery with which he has treated his former misrepresentation in reference to myself. If Mr. Erwen had entered into this discussion with a fair spirit of enquiry, and with a view of discovering truth for the enlightenment of himself and others, and forwarding the interest of legitimate mining it would have been a laudable and worthy object; but he has shown the reverse of all this by the particular evasive manœuvring he has adopted. It never was or is any part of my purpose to interfere with the just liberties of others, and I will take care not to allow even Mr. Erwen to infringe upon mine. There is no need whatever for him to be so solicitous about my susceptibilities, as they are in the hands of one capable of protecting his own interest; but what Mr. Erwen is or should be more particularly concerned about is to be careful in forming a rule by which he will in future be able to write truth. I have already shown that he has stated what is not true, and he has done—like all cowards are capable of doing—evaded the charge I made against him by a pretended cool manner and bald assertion; empty wind, in fact, instead of solid argument.

In your issue of May 31 he says—"I have again read my former letter, and have nothing to retract in any statement I put forward therein." That is unmanly, and not such an answer as I have a right to demand from him. It is a manner of getting out of a difficulty more readily attempted than effected. I do not mean to allow Mr. Erwen to escape from his responsibility so easily. I am quite prepared to stand by all I have or may state; but I am not answerable for what other people may write, and when Mr. Erwen made my first letter to contain words written by Mr. Stuart Mr. Erwen was fully aware what he was doing; but the mere act itself has lowered his dignity and status, if he had any, in the eyes of those who are lovers of truth and justice. Because my letter contained things which were distasteful to the relish of Mr. Erwen does it follow that he is at liberty to state deliberately that my letter contained a sentence to be found in Mr. Stuart's letter only? Certainly not; and until Mr. Erwen has withdrawn from the unenviable position he has taken up he must be subject to the heavy censure which the public know so well how to administer to those who have not sufficient regard to the good usages of society, propriety, self-respect, and the well earned credit of others to cause them to set right what they have, through carelessness or perverse wilfulness, done wrong. In the eyes of Mr. Erwen it is apparently a very light thing to misrepresent others, but the public will estimate such conduct at its full worth. The fact is, Mr. Erwen placed himself in a great difficulty, and afterwards saw no way out of it except by avoiding the points I raised altogether, and attempting to cover the matter over by introducing a confusion of new things. I will again take Mr. Erwen back to his letter in the *Mining Journal* of April 26. There we find him using the following words:—"Mr. Hoskold remarks—'Is it prudent to pay money for the purchase of mines?' and maintains the opinion that this should rarely be done." Now, these words are not contained in my letter of April 12 at all. In my letter of May 3, I challenged Mr. Erwen to prove in what part of my letter of April 12 the passage above quoted—and which he attributes to me—is to be found, and he has not only not done so, or explained the matter, but he has kept back from April 12 until May 31, inventing some subterfuge by which he hoped to avoid being brought to book. If I have used those words which he attributes to me why does he not point out where in my letter they are to be found? That is impossible, as he is fully aware, and all we find him saying is—"I have again read my former letter, and have nothing to retract in any statement I have put forward therein." Now, this is the truthful gentleman who evidently has a great desire to figure by ill-advised remarks in this discussion. Can anyone after this attach any importance whatever to statements he may think proper to make? I will let others give the answer. The words Mr. Erwen judged it advisable to tack on to my letter of April 12 were in substance, if not actually in form, written by Mr. Stuart in the Journal of the same date, and I pointed it out in my letter published May 3. Anyone can see that I am perfectly right on referring to the Journal of April 12. In Mr. Stuart's letter of April 12 he states—"With regard to the prudence of payin money for the purchase of mines I maintain the opinion that this should rarely be done." These are not my words, and Mr. Erwen has committed a libel in attributing them to me. The quotation given by Mr. Erwen runs—"Is it prudent to pay money for the purchase of mines?" and maintains the opinion that this should rarely be done, and, as stated above, I am made to say it. The words written by Mr. Stuart are—"With regard to the prudence of paying money for the purchase of mines I maintain the opinion that this should rarely be done." Now, Mr. Erwen has not only desired to add words in my letter which I never wrote, but he has mangled Mr. Stuart's words as well. So much for Mr. Erwen's accuracy. After all this is it likely that I would trouble myself about the jargon of "fathoms, gossan, killas, worth," and, above all "with granite to the north," which he has indulged in? Offer your chaff to young birds, Mr. Erwen, and see how many you can catch. Mr. Erwen disclaims any acquaintance with Mr. Salmon; but the latter stated in his letter in the Journal of May 10—"I do not know Mr. Erwen, although we are brother geologists." It is clear to my mind that if Mr. Erwen is not actually Mr. Salmon himself the latter must know the former, because he says "we are brother geologists," and how is this circumstance known to him? In your issue of the 31st ult. Mr. Léon says that Mr. Erwen is not a Fellow of the Geological Society of London, although apparently Mr. Salmon is. Mr. Salmon could not, therefore, know Mr. Erwen as a "brother geologist" that way; then, are we to conclude that he must know Mr. Erwen or the representative of that name some other way. In either case one thing is proved clear enough to those who can see—that in spite of their protesting to the contrary they must be acquainted. Here is another little difficulty for Mr. Erwen to get over. I should be sorry to give him too much work, as I am impressed with the idea that he has hands too full already. Am I to obtain Mr. Erwen's consent before I am at liberty to correct any error which may have crept into a letter of mine? Pray what pretensions shall we have next? I am anxious to do nothing but what in my judgment I consider right, and I wish I could believe Mr. Erwen had no other object. H. D. HOSKOLD, C. and M.E., F.G.S., &c.

Madrid, Spain, June 2.

BOOROOK SILVER MINES, NEW SOUTH WALES.

SIR,—The following extract from this day's Sydney Morning Herald may interest such of your readers as understand the treatment of blended gold and silver ores—which we in Australia most certainly do not; and also serve to call attention to mines which promise at no distant date to develope into the same general class as the Nevada Comstock lodes:—

Regarding the Boorook Silver Mines, the correspondent of the Border Post on the 1st inst. writes that some new finds have lately been made. The first is a reef in the neighbourhood of the Grand Junction. The prospector is Mr. Hardman, who has named it the Lizzie Lee. I have not ascertained the width of the reef, but the stone which I saw looks well for silver. The next discovery has been made east of and at right angles with the John Moffat reef. About this find I cannot say much at present, as it has only been opened on the surface, showing a reef about 18 in. in width, with gold pretty fairly distributed through the stone. The discoverer is a Mr. R. Johnston, and it is called Murray's reef. On the other lines very little change is perceptible since your visit, with the exception of the Golden Age. In the prospect claim, Mr. Horton has increased the number of hands, having now eight men engaged raising a great quantity of rich ore. No. 1 north Westhoven and party have struck the reef at a depth of 33 ft. The vein is about 18 in. wide, and equally as rich as the famous Golden Age prospect claim. In No 1 south nothing has been done worth mentioning since your report. In No. 2 south Messrs. Hutchison and Co.'s tribute, the holders, not being satisfied with the appearance of the leader they were sinking on, and thinking there might be something better to the east, put in a cross-cut, and are now on a reef 4 ft. wide. On the John Moffat the holders have just commenced sinking in the prospect claim, and are down about 9 ft. with a reef averaging 1 foot wide, and showing good silver. Messrs. Moffat, Flannery, and Co., have made a move towards placing a crushing-machine on Sawpit Gully. The excavation for the breastwork of the dam is being proceeded with, and the contractors, Messrs. Coates and Wheeler, expect to have it completed is about eight weeks. Some of the crushing plant is expected to arrive to-day, and in the meantime a competent engineer has been engaged to put it in position for working. Mr. Horton has his second Wheeler pan in full swing, and during the present week two more pans have arrived, and the proprietors are now making preparations to have them placed in a suitable position for working.

I can also say of my own knowledge that Mr. Horton has fought thus far towards success against every disadvantage, and that although his treatment of the ores is probably the best at his command, yet it is not the treatment which will give the fullest results, and that there is evidently a large scope in this new field for the use of science and capital combined. R. D. ADAMS.

Sydney, April 10.

RAILWAYS OF NEW SOUTH WALES.

SIR,—As the bulk of our New South Wales "National Debt" is incurred for railways it may interest the English investors therein to know something about its outlay; and, as Mr. Charles A. Goodchap, our Commissioner for Railways, has himself furnished me with the following information from his official return and report for 1877, the accuracy of it may be fully relied on:—

Cost of construction to date, 9,314,500*l.*; interest, 443,688*l.*, or 4·76 per cent.

Capital expended on lines open for traffic, 8,883,177*l.*; interest, 4·81 per cent.

Net earnings, 396,935*l.*, yielding 4·26 per cent. on total capital expended, and 4·47 on cost of lines open for traffic.

At the close of 1877, 598 miles were open for traffic, and 217 miles in course of construction, to be completed by end of 1880.

The rolling-stock consisted of 138 locomotives, 352 passenger, and 2806 goods vehicles.

Number of employees, 3289; wages paid, 305,581*l.*

Cost of the railway materials, 375,341*l.*; freight and insurance, 31,169*l.*: total, 406,510*l.* Vessels employed in conveyance, 92.

During 1877, 33,707 passenger and 23,532 goods trains were run a distance of 2,106,802 miles. Number of passengers—first class, 703,325; second class, 2,253,819 (no third class). Percentage of 867,618 journeys—first class, 13·82; second class, 56·84; season ticket, 29·34.

Merchandise traffic, 580,657 live stock, 133,597 bales of wool, 1,024,411 tons of minerals, and 360,932 tons of general goods.

Average earnings per mile open, 1478*l.*; expenditure, 759*l.*; net earnings, 719*l.* Increase over previous year in passenger traffic, 37,718*l.*, and of goods traffic, 84,977*l.*: total, 122,695*l.*

Increase of interest on capital on combined North, South, and Western lines, ·04 per cent.

The sudden and steady increase of business, consequent on opening up the interior, so far only even, has induced the Government to lay out a comprehensive scheme of extensions—north, south, and west—to an extent of another 1100 miles, and the enormous quantity of rails and ironwork in connection with that, and also the proposed waterworks for Sydney, is likely to lead to our working the extraordinarily rich deposits of iron mines at Wallerawang—so that the colony will gain, as it were, in two ways by its spirited public works policy.—*Sydney, April* 10. R. D. ADAMS.

CENTRAL RAILROAD COMPANY OF NEW JERSEY.

SIR,—Allow me to draw the attention of your readers to the *Seven per Cent. Income Bonds* of this company, quoted at 69 to 71. The total amount required to pay 7 per cent. on 490,000*l.* is only 34,300*l.* per annum. The traffic continues to increase in a most satisfactory manner, and the ordinary shares are now 54 to 55. The interest on the *Mortgage Bonds* is provided for, and will be paid in October, when it may be safely calculated that the *Income Bonds* will take an important position as an investment. At the present price of 70 they will yield 10 per cent., besides the rise in value which is certain to take place.—*London, June* 13. B. E.

RICHMOND CONSOLIDATED MINING COMPANY.

SIR,—I was glad to find that before the close of the meeting of last Wednesday our Chairman had become a convert to the proposal of raising a reserve fund. To show the importance of this step it will be unnecessary to do more than point to the instance of the St. John del Rey, which but for a fund of this kind would, in all probability, have been lost to its shareholders. As, unfortunately, the company did not avail itself of the opportunity last year, when there was a surplus of some 55,000*l.*, which would have accomplished the object, and the proprietary being, as indeed all proprietaries are, of a changeable character, there are now difficulties in the way of most schemes, but I think the difficulties might be overcome by deciding not to divide the whole of the profits, but to retain a certain percentage until the sum of 55,000*l.* had accumulated, and then to issue *pro rata* one new share for every five held in the company. I dare say there will be objections, such as that the proprietary has said before, being a shifting body; those persons who wished to sell their shares would be deprived of a certain portion of their profits, but the sum retained would give enhanced value to their shares, and besides I think it somewhat absurd to expect that the general interests of the company are to be sacrificed to the convenience of a few speculating shareholders.

June 11. EDW. DEARLE.

RICHMOND MINING COMPANY.

SIR,—I think the most satisfactory statement made by the Chairman at the meeting held last week was the following:—"I am happy to be able to inform the shareholders that within the past few months the Legislature of Nevada have passed an Alien Act, which will have the effect of enabling us to put ourselves in a very much more satisfactory position as regards our property." This was the very thing I urged upon the directors last year as the only means of really strengthening the position of the company in America. I am glad to find the directors and their solicitor are at last alive to this matter, though they have been a very long time about it. In November, 1874, Mr. Probert wrote to the board on the position of the present dual management as follows: "It seems to me that the time when this double government which is proving so embarrassing may be done away with. The patents are obtained, and only await your orders to be transmitted to London, and the company may become the masters of their own property at any moment."

Nearly five years have since elapsed, and the English company are not "masters of their own property," the patents being again reconveyed to the Nevada incorporation. I was also glad to hear the Chairman intimate that in the case of the lawsuit the appeal now pending at Washington might not be heard at all, as from the present outlook the decision rendered by Judge Field in August, 1877, in favour of the "big lode" theory might after all best suit the Richmond Company's interest. It is a pity that the management were not blest with this foresight, or "hind"-sight mentioned by the Chairman, in 1877, and so have avoided all that unfortunate delay, legal expense, and muddle which ensued from trying to overreach our neighbours. I think the Chairman will find on referring back that though Mr. Clarence King may have assisted Messrs. Corrigan and McGee in selecting the site for the present "main shaft," he had nothing to say or do with the dimensions thereof, as subsequently carried out. I believe I am correct in saying that I remember Mr. King telling me in New York he had nothing to do with determining the dimensions of this shaft. The Chairman complains that Capt. Tonkin's report did not contain any practical suggestions as to improvements in working, and states that the directors regret that these suggestions are conspicuous by their absence.

As the directors appear to be on the *qui vive* to do their devoir in the interests of the company it will not be amiss if I take this opportunity of calling attention to certain points in their report and statement of annual accounts which they have not made quite clear and satisfactory, but which can, doubtless, be made clearer next year. As most of the money is sunk in mining, smelting, and refining, it will be interesting to notice what our next-door neighbour, the Eureka Company, has expended. Last year the Chairman stated that the Richmond and the Eureka Companies were smelting under exactly the same circumstances, having ores of the same sort, and cost of freight, labour, &c., the same. It was thereupon shown that the Eureka Company's working was 30s. per ton cheaper in the item of smelting, which made a difference to the Richmond shareholders of nearly 40s. per share on this one item alone.

The following statement, which is compiled from the last official annual accounts of the two companies, will show that the Eureka Company is again more successful than the Richmond in working results. The directors of the Richmond Company have shown in abstract C that the cost of smelting was $14·29 per ton on 37,447 tons of ore. These 37,447 tons include 3706 tons of purchased, or fluxing ores, as they always used to be termed. The cost of these 3706 tons was 21,092*l.*, as shown in No. 2 statement. It would, however, appear from abstract F that 5245*l.* 16s. 6d. of the purchased ores, or 523,606 tons, as shown in the note to the smelting and bullion product statement, were charged to the refinery. Instead of there being 37,447 tons smelted, as shown in abstract C, there were, therefore, only 36,923 tons, which showed the cost of smelting to be $14·49, instead of $14·29. But as nearly 524 tons, or 5246*l.*, of these purchased ores are charged to the refinery, in abstract F, why are the remaining 3282 tons, or their cost, 15,846*l.*, not charged to the smelting, in abstract C, especially as the Chairman states that the only object in buying these ores is that "they furnish a flux and mix well with our own ores, thereby helping the smelters?" This would show the smelting cost to be $16·65, instead of $14·29 per ton of ore, as against $11·56 in the case of the Eureka Company. But even taking the directors' own figures for cost of mining and smelting per ton of ore, there is a difference shown of $8, or 32s., in favour of the Eureka working. This represents a loss to the Richmond on the 37,447 tons alleged to be smelted of very nearly 54,000*l.*, or 1*l.* per share. Deducting from this amount the loss by the late fire—18,156*l.*, as given in statement 3—there would have remained more than enough to have paid a 10s. dividend per share in May last.

It will also be seen that though there has been more economy shown in the item of fuel per ton of ore smelted, yet the Eureka Company is still ahead of the Richmond to the extent of $2, or 8s., per ton of ore, which on the 37,477 tons smelted represents a loss on the Richmond smelting for the past year of nearly 15,000*l.* Judging from past results, and the following remarks made by the New York Engineering and Mining Journal of Jan. 25 last, it would seem that the Richmond management have something yet to learn about fuel and the metallurgy of auriferous ores:—

"Now, every metallurgist is aware that the true test of management is the fuel per ton of charge—that is, of ore and flux. At the Richmond Works no flux is needed (except a couple of shovelsfull of slag), hence the fuel per ton of ore is a fair measure, and the Eureka being similarly situated the comparison is fair. But in judging the economy of other works, the charge, not the ore only, must be taken as a basis. In this way we may consider the instances cited by Mr. Probert (vide page 63 of his reply):—

Works.	Per ton of ore.	Per cent. of fuel. Per ton of charge.
Miller, Salt Lake	28·8	25·68
Saturn, Salt Lake	32·0	20·0
Winnemuch, Salt Lake	47·2	24·9
La Pise, France	30·0	22·7
Clausthal, Hartz	39·99	15·0
Clausthal (Kast furnace)	61·2	20·77
Freiberg, Saxony	33·6	14·4

Mr. Probert gives, for comparison with the 36·12 per cent. of fuel used at the Richmond, the first of these columns and not the second, although the figures of both are given in every instance in the report from which he quotes! And on this shamelessly garbled statement he remarks:—'Here we find, according to Mr. Eilers' own showing, the consumption of fuel at some of the most famous lead-smelting works of Germany and France, as well as at Salt Lake, to have been much higher than at the Richmond Works. And I leave it to him and his friends of the committee to reconcile as they best can the above with the statement he makes in the report to them that 'the consumption in the Richmond furnaces was out of proportion to any he had occasion to see or be informed of.'" The Editor further remarks that Mr. Probert "should use more candour and *less charcoal*."

It is to be regretted that the refinery account is still allowed to appear as a dark page to the shareholders. Although the marketing and refining expenses are shown in abstract E and F, there is no statement showing the actual expense per ton of base bullion for marketing and refining. The Eureka Company show their shareholders that the cost of marketing and refining, &c., 15,199 tons of their base bullion was $840,592·58, or $55·30 per ton. The Richmond expenses are shown in abstracts E and F to have been $683,500 (136,700*l.*), but no mention is made of the cost per ton of base bullion from the furnaces, although in the cases of the mine and the smelting (abstracts B and C) the cost per ton of ore is given. The product of base bullion from the 37,447 tons of ore smelted is shown in the smelting and bullion statement to have been 7652·663 tons. Of this it would appear from statement No. 2 that there were 770 tons at Eureka, leaving 6882 tons as shipped for market. Then in statement No. 2 for 1877-78 there were shown 2393 tons at Eureka awaiting shipment, &c.; adding these to the above 6882 tons the total tons shipped, &c., are 9275. If this be the actual tonnage dealt with in the abstacts E and F the cost per ton of base bullion will be $73 69, as against $55·31 in the case of the Eureka, or a difference of $18 39 per ton, which on the 9275 tons represents $170,567, or 34,113*l.*

Turning to the statement of ores smelted and the base bullion product, the gross assay value per ton of Richmond ore is given on the left-hand side in column 2. The yield per ton of ore smelted is

shown in the last right-hand column. The difference between these two columns is supposed to represent the loss of metals in smelting. There is evidently something wrong in some items of this smelting statement, as shareholders will easily see. The Richmond management have repeatedly asserted that "good, close smelting work was a smelting-furnace loss of 15 per cent. of the assay value of the ore." In the similar statement furnished for 1877-78 the loss in smelting is shown to be only 7·06 per cent., or $5·70 per ton of ore! It is these discrepancies which serve to create a want of confidence in the alleged realisation given in page 2, paragraph 3, of the directors' report. Whilst the Eureka shareholders received in dividends about 40 per cent. of the gross value of their ore product, the Richmond shareholders received about 26 per cent. The gross value of the Richmond and Eureka ores were nearly the same per ton; and the number of tons of ore per ton of base bullion was also nearly the same.

COMPARATIVE STATEMENT of Working Results as shown in the Official Accounts issued to the Shareholders of the respective Companies for the past financial year:—

	Eureka.	Richmond.	Difference.
Cost of mining and hauling, including deadwork, per ton of ore from the mine	$ 6·60	$11 88	$ 5·28
Cost of smelting per ton of ore	11·56	14·29	2·63
Cost of fuel per ton of ore smelted	7·50	9 50	2
Cost of mining and smelting per ton of ore	18 16	26·17	8 01
General expenses per ton of ore from the mine	0·89	2	1·11
San Francisco Eureka office and London Richmond office per ton of ore from the mine	0·12	0 65	0·53
Dividend paid per share	36	14·37	21·62

June 9. R. M. BRERETON.

RICHMOND MINING COMPANY.

SIR,—The remarks made by the Chairman at the annual meeting last week in reference to the state of the existing lawsuits between the Richmond and its neighbour, the Eureka Company, astonished and alarmed me, indicating, as these statements did, that the board contemplated yielding without further struggle all the points in dispute; the only ground for this change of front being that the judge's decision might prove more advantageous in its relation to the future than would the reversal. That argument would be worth something if it was on all-fours with the facts, which is certainly not the case. Judge Field gave a very clear exposition of the mining law of 1872 in reference to the limitation by that enactment of all future extensions from its date of lodes to boundaries running at right angles to the longest sides of new locations. But that law was not retrospective, and could not affect the right of the original Richmond under the law of 1866 to follow the lode, however erratic its course might be. The judge evidently saw this, and, therefore, supplemented the 1872 law, which alone would not have given the Eureka our lode, by wrongfully importing into the case the compromise agreement of 1873, which, both in words and by plan, unmistakeably limits the boundary between two fixed points without power of extension, and arbitrarily stretches that boundary in a northerly direction, coincident with that which the law of 1872 would give to a new location, in order to concoct out of the two materials some colour to the Eureka claim on our great lode.

It is impossible that Judge Field's interpretation of that compromise agreement can hold its ground before any impartial tribunal. Mr. Probert told me that the views I had expressed of the real nature of that document and its bearing on the case had been fully endorsed by all the counsel on our side. I still maintain that this agreement in its integrity deprives the Eureka Company of all chance of success, and that we have a claim against them for the 300,000*l.* sterling in value which they have taken out from our lode. The decision which inflicts on the Richmond this tremendous loss deprives us of vastly more than it concedes to them, because it only confers the right to the lode between the boundaries created by lines at right angles to the Eureka front, whereas it deprives us of the right to follow the lode to an indefinite extent.

It is not simply Judge Field's decision, but the law of 1872, which gives the Richmond the right to the extension of lodes at right angles to the face of its new locations, and a reversal of that decision would not, therefore, affect us unfavourably in respect to our later acquisitions. The long series of events which have forced on the Richmond such frightful law costs and disastrous losses are all traceable to the manner in which the vendors' title was imposed on the board. It would certainly be a suitable finale to that original policy to surrender our lawful claim for the reasons now assigned.

June 11. JOHN ELLIOTT.

RICHMOND MINING COMPANY.

SIR,—Perhaps you will allow me to make a few remarks upon the statement of accounts of this mine to Feb. 28, just published, and which bears out to a great extent the criticisms made in my letters some months ago regarding the position of the company at that time, and the undesirableness of paying the quarterly dividend then announced. In the circular issued by the directors declaring the February dividend they stated that the balance in hands of the bullion agent on Dec. 1 was 50,000*l.*, which, with 7000*l.* stock at the refinery, was quite sufficient to pay the dividend of 10s. and the debentures falling due. Well, besides the amounts mentioned there must also have been about 25,000*l.* of stores on hand, and the produce of bullion to Feb. 28 from Dec. 1, was valued at over 100,000*l.* (the profit for February alone being stated at 10,000*l.*), and yet after including bullion, stores, and ore on dumps, the accounts show only the small balance of 19,000*l.* at credit. Such a result must surely have been very disappointing to the directors after their previous statements.

Then the accounts show that the entire profit of last year's workings available for dividend (97,000*l.*) remained unrealised on Feb. 28, in the shape of bullion, stores, and ore, all of which had to be drawn upon in order that the last three dividends might be paid. The amount of advance from the bullion agent on Feb. 28 was 47,000*l.*, and in order to pay off debentures a week or so later the amount of advances would require to be increased to 75,000*l.*, on which 1 per cent. per month is being paid, or at the rate of 9000*l.* per annum. It was very satisfactory to learn that the company had received 4000*l.* in interest (less one year's interest on debentures) during the past year, but it is not so satisfactory to know that the company is now paying at the rate of 9000*l.* to 10,000*l.* a year for interest on borrowed money.

The considerable advance in mining and smelting expenses is referrred to in the report, but no explanation is given of the serious advance in "marketing" expenses, which are this year 17 per cent. on the "gross bullion" realised, against only 10 per cent. the previous year, and the refining expenses also appear to have increased; but as no details of the working of the refinery are given in the accounts it is difficult to say to what extent. And the total "working expenses" for the year—not including the loss by fire, committees' expenses, &c.—amount to 9*l.* 17s. 6d. per ton, being an advance of 20s. per ton on the previous year. I am surprised that no questions were asked regarding these points at the meeting, and that no explanation was offered. Neither was any reference made to the Eureka Company's claim for damages, which I understand will soon come before the Courts, and which, although pitched at the preposterous amount of 400,000*l.*, may end in a very substantial award, seeing that the suit on which the claim is based has already been decided in favour of that company.

Many are asking how it is that with bullion produced since March 1 of the value of 150,000*l.*, and a balance of 19,000*l.* brought forward, the directors should not consider it advisable to declare a dividend at present, but when it is considered that the working expenses are nearly 10*l.* per ton, that the average of the ore has fallen from nearly $68 per ton to about $55 (since March 1), that such a quantity of bullion remains unrealised, that such large advances have already been made against it, and that the company is entirely dependent on loans for working capital, the reason is not far to seek, and as no new ore bodies have yet been discovered, and the present chambers cannot last many months longer (although the output has been greatly reduced), I would not be over sanguine about dividends being resumed at an early date.

As to the question of a reserve fund, I see Mr. Elliott made some very good remarks on the subject, which do not appear to have received the consideration merited. The setting aside of 50,000*l.* when the company were in funds would not I think be entirely for the benefit of future shareholders, as stated by the Chairman. The knowledge that there was such a fund for working capital, or available for contingencies, such as the defence of the mine, &c., would decidedly enhance the value of the shares very considerably, and under certain circumstances might be the means of saving the mine to the shareholders. But it is amusing to find that the necessity of a reserve fund is only recognised when the company's funds are at a low ebb, and when it is quite impossible to form one. INVESTOR.

June 12.

FLAGSTAFF MINING COMPANY.

SIR,—Will you allow me, through your valuable Journal, to state to my fellow-shareholders that upon making enquiries at the company's office I find that though the Tarbat appeal case has come before the Supreme Court at Washington, as noticed in last week's Journal, has been decided adversely to the company, yet as all action taken in the said Court was without either the knowledge or the sanction of the company here, or of their legal adviser in Utah, that the whole proceeding can be re-opened by the company taking the proper steps to do so; hence that matter is by no means so black as would appear on the surface. I am also informed that the litigation in Salt Lake City, in which the company is interested, is expected to be settled at a very early date, and that our directors, in concert with the committee (specially elected by the shareholders in general meeting, as an additional watch over the shareholders' interests), are actively preparing to take early steps to put matters relating to the property in a shape that will, I believe, be heartily and thankfully endorsed by the body of shareholders. In the meantime let me intimate my conviction that all shareholders would best serve their interest by lending an undivided trust to our directors and the committee, and not give heed to movements of outsiders.—*London, June* 12. A LARGE SHAREHOLDER.

RUBY CONSOLIDATED MINING COMPANY.

SIR,—Had your correspondent, "M." (whose letter appears in last week's Journal), been present at the extraordinary meeting held on the 3rd inst. he would have heard the Chairman read letters, received that day, from the company's agent in San Francisco and Eureka, which fully confirmed the statement of the Chairman that the company was by its agents in full possession of all its mines, machinery, appliances, water rights, &c., with an indemnity from Mr. Heynemann against any claims that might be advanced. This is corroborated by the letter from your San Francisco correspondent, "E. J. J." It seems to me that it matters little at present if the shares are only quoted at 1*l.*; for surely none of the holders will part with their shares at anything like this price after so long holding through the "bad times." In 1874 it seemed almost madness to attempt redress; but the unprecedented perseverance of the Chairman and board, as well as the agents they selected, has now achieved a feat of which they may justly be proud. I agree with "M." that all deserve well at the hands of the shareholders.

June 7. D. F.

CHONTALES MINING COMPANY.

SIR,—As an old shareholder in this company I cannot refrain from asking to be allowed, through your columns, to urge upon my brother shareholders the absolute importance of supporting our excellent board by subscribing the small amount of capital required to enable them to carry on the company for the benefit of the present proprietors, who I cannot believe will, notwithstanding all our vicissitudes, allow it to pass into liquidation. We have, as is well known, a most extensive property, with practically an inexhaustible supply of mineral. Our machinery is now in good working order, capable of treating very large quanties of ore. Our manager is, we believe, honest and energetic, and with the instructions sent him will, doubtless, be able to save more of the gold than he has hitherto done; and when it is remembered that the yield of an extra pennyweight would convert our small loss into a fair profit, it does appear to me that it would be most suicidal not to subscribe the small amount of debentures, and give the property a chance of rewarding those who, like myself, have not yet lost faith in its success,

June 12. B.

P.S.—Since writing the above I am glad to learn that the reports just to hand show a more favourable result than those of the last few months, and hold out still better prospects for the future.

THE THARSIS COMPANY'S ACCOUNTS.

SIR,—The Tharis report is out. It is impossible to understand how their profit is arrived at if their valuations of stocks on hand are at current prices. The Rio Tinto confess to a loss of 6*l.* 2s. 6d. per ton of copper, and 5s. per ton of pyrites. The same experience in Tharsis would make a loss of 120,000*l.*, or about 12 per cent. dividend. I suggest at the meeting that the question should be asked—of what does the stock on hand consist? How much copper, how much pyrites, and, in both cases, at what prices? If at to-day's prices the loss to be accounted for is much larger than 120,000*l.*, copper, for instance, is 9*l.* lower June 1, 1879, as compared with June 1, 1878. J. B.

DEMONETISING SILVER.

SIR,—Prince Bismarck is now proving his sense and courage by acknowledging his mistake in reference to the demonetisation of silver in Germany, and in publishing to the world his intention to retrace his steps. That is the fact to be gleaned from Lord Salisbury's letter to Lord Cranbrook. That is the first glimpse of common sense in reference to this world-wide question which I have seen of late in financial circles. To mining men this question is of vast moment, as affecting the value of their production; it is scarcely of less moment to the agricultural interest. As I have for many years past endeavoured to prove, it is one of the great keys to commercial prosperity, and I should advise your readers to watch the debates now going on in the House, and to throw whatever influence they may have into the scale of promoting the bi-metallic theory and in opposing the suicidal policy of demonetising silver.

June 13. JOHN ELLIOTT.

THE LONDON COAL SUPPLY.

SIR,—With special reference to my letter in last week's Journal, allow me to state that the part I have taken towards displacing the Great Northern Railway and other coal transport to, and traffic in, the Metropolis, at the immense annual saving of 4,000,000*l.* sterling to the consuming public, computed on the coal imported per the official return of the Registrar of the Coal Market, and the difference in price arising between the current selling prices and those at which the identical category and quality of coal can be delivered by the proposed undertaking from the pit's mouth into the consumers' premises, steamers, &c., after apportionment of a minimum 10 per cent. annual dividend to investors, and payment of all charges of whatever nature, minutely developed in my preceding correspondence, comprising a redemption fund, insurance, repairs, &c., is so fully matured that with the commencement of the autumn the progressive annual delivery of 5,000,000 tons of coals can be inaugurated, and continuously prosecuted. It is full time that the metropolitan consumer, and the coal owners, as vendors, should emancipate themselves from the intolerable thraldom, writhing under which, as commented upon by the aristocratic as well as the plebean Press, they are mulcted to the incredible extent of fifteenfold the cost of water carriage of indigenous coal to the great centres of consumption and export in the United States of America, now exporting coal to Europe.

With the unqualified public admission by the chairmen and general managers of the great coal carrying railways to the Metropolis that railway transit cannot compete with water carriage there is no legitimate ground for further procrastination, more especially as never before could the requisite *materiel* for transport be so cheaply acquired as at present. In one of your contemporaries I find last week an eminent Sheffield manufacturer showing forth in accentuated language the immense disadvantages under which that important coal district is labouring by reason of want of an improved system of water carriage. There is much in Sir Rowland Hill's response to a deputation of the Corporation of London last Friday possessing a favourable bearing upon my case, but I dare not presume to encroach further on your valuable space, having already so voluminously and exhaustively treated this subject matter.

WILLIAM JOSEPH THOMPSON.

20, *Little Tower-street, June* 11.

STRIKES.

SIR,—Enough has already been inserted in the *Mining Journal* to convince the most sceptical that "Strikes" are unmitigated evils, and that none but unreasonable men would initiate or patronise them. The object is wicked, and in my own experience I have suffered from the adoption of such a bad policy. In the year 1845, when there was a rage for railways, I contracted for the supply of nearly 40 miles of plans and sections at 20*l.* per mile. I had at the time in my service three assistant surveyors at three guineas per week each, clear of expenses, the terms on which they agreed to assist me till the end of November. When they discovered the terms of my contract with the engineer of the line they came to me and said that they should decline to work any longer at three guineas per week. I said, "You agreed to work for three guineas per week." "Yes, we did; but we did not then know that you were to have so good a price." I said, "What do you wish?" "We will work for a guinea a day, and not under," said they. So to be enabled to get through my undertaking I had no alternative but to comply with that demand. I had to pay all travelling expenses and hotel bills, which were very heavy, and the guinea per day till Nov. 30. But it was a bad business for me, because I lost my charges (730*l.*) and all the legal costs (60*l.*) in sueing insolvent employers. The scheme fell to the ground, but a railway serving the same district has been constructed since by other promoters. From that time (1845) to the present I have hated strikes. S.

Truro, June 11.

CORNISH MINING, AND ITS UNWROUGHT GROUND.

SIR,—There is not one-half the mystery connected with this enterprise as would appear to deter the attention of private capitalists from its study. Taking the history of the past as a guide for the future, we shall see that the money-making part of it is by the development of new ground, of which there are vast tracts throughout the county. Originally pieces of ground were chosen by men experienced in the practical research of mining, a capital of about 2000*l.* being considered sufficient to test each of their merits or demerits. In the case of Devon Great Consols, before one-half of this amount was spent a mine of wealth was discovered. Its equal has not yet been found throughout the kingdom. At a depth of 15 fms. from surface a lode of copper ore 40 ft. wide was discovered, the whole of which was worth on an average 12*l.* per ton, which extended in length about two miles, and in the last 30 years gave the holders a clear profit of a million and a half. The case of South Caradon was a similar one; the sett not being so extensive the returns could not be expected to come up with Devon Great Consols, but up to the present 375,000*l.* has been divided as profits.

The leading Cornish families are indebted for their influential positions and wealth to the expenditure of small sums in shallow mining, the promotion money asked for some schemes introduced to the public being alone sufficient to test the value of some half dozen, and were capitalists to turn their attention to this class of mining there is the same scope for them in the development of well-selected pieces of ground around the granite upheaves of Cornwall as made the colossal fortunes of the merchant princes of the county. When the Tresavean Mine was first taken up operations were commenced on the surface outcrop of the copper lode, the expenditure being less than 1000*l.*, and was followed by a division of profits in one year of 60,000*l.* The major portion of the good mines were found to be rich close up to the surface, increasing in extent and value as depth was attained.

In the neighbourhood of some of the noted copper mines of bygone days mines are being wrought on a small and inexpensive scale by county men which are as likely to turn out rich prizes as their once famous neighbours, the outlay and risk being comparatively nothing. Yet, strange to say, parties seeking employment for money prefer to risk all in market mines to this more legitimate and business-like enterprise. The result is often a loss to the speculator, and mining gets the blame for what gambling ought to have. If the investor will join the progress of this class of mining property he will ere long be convinced that we have an inexhaustible field of operation in our own little home domain, be the means of saving much money from being squandered in ill-directed channels, disaster to the willing adventurer, and beyond this, give employment to thousands of half-starved fellow-creatures, at the same time keeping the sinews of the country at home when it is so much needed to compete with the rapid strides of other nations. CHARLES BAWDEN.

St. Day, Scorrier, Cornwall, June 10.

MINING IN CARDIGANSHIRE.

SIR,—As the mines of which I am about to offer a few observations have attracted much attention, and the welfare of the mining population in their districts depends much upon their success, I feel confident you will allow me to send you an account of their positions and prospects that may be confidently relied on, having had ample time in passing through Cardiganshire and into North Wales to give them that attention which now enables me to place the following facts before you. I will proceed with the Cambrian Mines, where the present company have sunk their engine-shaft from a 20 yards level under adit first to a 46 yards level. The engine-shaft all this distance passed through a very rich bunch of copper ore, and the 46 east for the entire distance driven, and for the width of the drivage 5 ft. (the lode being from 20 to 30 ft. wide), has been worth, on an average, at the present price of copper ore not less than 60*l.* per fathom, and can be worked away at a tribute of 1s. in 1*l.* The 46 yards level driving west has opened out both lead and copper ore, worth on an average 15*l.* per fathom, and can be worked away at a tribute of 4s. in 1*l.* The engine-shaft has been sunk under the 46 yards level, and is fast approaching a 70 yards level, all the way through a rich course of copper ore, and there is every indication of the lode opening out at the 70 yards level even richer than the 46 yards level opened, and is still continuing to open—the vein on the eastern forebreast yielding 6 tons of the richest copper ore per fathom I ever saw raised in this country. Had not the winter proved a very severe one the engine-shaft would have long since reached the 70 yards level, and would be now fast approaching the 100 yards level, and many fathoms of ground would have been laid open both in the 46 and 70 yards level east and west—and, in fact, the mine would have been in that position to be fairly worked, but as it is it will take six months to lay open ground and sink winzes from the 46 to the 70, so as to give ventilation, as well as to facilitate the cheapest method for working the ore ground properly, and in a miner-like and systematic manner. From the 70 down to the 150 yards level such masses of copper eastward and lead westward of the engine-shaft will unquestionably be met with as will astonish the most sanguine shareholder connected with these mines, and will lay open a mine such that its equal has never been found in this county, nor probably in the Principality. If we look at the results obtained from the present sinking and driving of a few fathoms of ground (for very little has been stoped away) they are simply enormous, 90 tons of very rich copper ore having been dressed and sold—a like quantity and of a higher percentage now ready for sale, besides 30 tons of cleaned lead ore. I will say but little more, and that little shall be that those wiseacres or wise-heads who had predicted that no mines in Cardiganshire will ever produce large quantities of copper ore are destined to have their predictions non-fulfilled at the eastern portion of this

grant at Esgair-Fraith, where it may be relied on that a greater and a much richer body of copper ore is deposited than the Devon Great Consols with all their run of mines produced.

So much for the Cambrian. On hearing of the discovery at Talybont I took an occasion to see it, and found the course of ore at surface was entirely in virgin ground, and for some 8 or 10 fms. which had been laid bare very rich for silver-lead ore, the eastern portion, on which a shaft was commenced, being by far the richest portion, the lode in that place yielding as much as 4 tons of ore to the fathom. This lode passes through the "wern," where there is an ample field of machinery erected for dressing, and where a very large quantity of what is termed "boulders," or loose solid stones of lead ore from the lodes, have been found in considerable quantities, and in a position to be in a line with the present direction of this discovery, which is about 10° north of east, and is the best direction of any lode yet opened upon in the grant. From the facts I have stated there is every reason for supposing that this course of ore will not only retain its present richness, but in depth eastward from the dip of the ground be found much more productive than where found at surface. Some very rich courses of ore have in olden times been found and worked from surface at this mine; but I may affirm with truth that these discoveries have been made on caunter lodes, and have never commanded that confidence of their lasting qualities (although some of them produced very large courses of ore, and of very great value) that the present discovery on the new lode has inspired me with. There are, however, many other objects of great interest, and trials of great importance that could be made for a very small amount, and if the 2000*l.* intended to be raised is forthcoming this property is, I consider, safe to enter the dividend-list in a few months. TRAVELLER.

June 10.

ROCHE FELSPAR WORKS.

SIR,—This company, through the suggestions of one of the resident shareholders, have driven two open drifts through unexplored ground—one drift on the north-east side, and one on the south-west, and their labours have been successfully rewarded in revealing a fine bed of spar of unusual thickness and quality—thickness at present 16 ft., and dipping forward; quality superior to any yet worked. This bed has been proved by the resident manager to extend over a large area, and with only from 18 in. to 2 ft. of overburden upon it, can be raised and be prepared for a trifling price per ton, being free from water, &c.; and as all their machinery and material is in good working order, there can be no hesitation in saying this is one of the good things that is required so much in Cornwall. The manager having every confidence in returning a good profit to the company, as there is plenty of demand, and the work carried on under economical principles. The company may be congratulated on their success, and it is hoped the works, which have proved such a blessing to the neighbourhood in finding employment to so many in these depressed times, and especially during the late cruel winter, which has been one of unparalleled severity, will still continue to do so.—*June* 9. SHAREHOLDER.

BRITISH SILVER-LEAD MINES.

SIR,—Being in the neighbourhood I paid a visit to this property. Starting from Diffws station I followed the railway to the mines, where on the dressing-floors men were busy crushing the rich lode-stuff from a large pile. A few yards to the south the main lode crops up to surface, and can be distinctly traced for three-quarters of a mile on its course. There are numerous feeders coming into the hanging side; at these junctions large deposits of ore will be found. In the forebreast of the 10 yard level west the vein is 3 ft. wide, and full of rich ore; further west, for 600 yards, trial shafts have been put down on the back of the lode, and from the rich quality of the lodestuff large quantities of lead ore will be extracted. Nothing has yet been done on the parallel or north lode, but the agent says it will be equally as rich as the main lode. There is also a slate vein in the property, which is profitably worked in the adjoining sett. The area of the take is extensive, and the royalty on lead ore, blende, and slates is 1-15th of the market value. Considering the great extent on the course of the lodes, the congenial nature of the strata in which they are embedded, the rich quality of the ore, the ore ground already proved, and the railway and other facilities for cheap working, I am of an opinion that this is one of the best investments before the public. MINING ENGINEER.

SOUTH CAMBRIAN MINE.

SIR,—It is a source of much pleasure and great satisfaction to me to be able to inform you that the prophecy of Capt. Absolom Francis, of Goginan, respecting the finding the blende giving way to lead ore in the main lode of this mine as greater depth is attained has been thoroughly fulfilled, for on Thursday last, in driving the deep adit east, and where we are gradually gaining height, we entered a good mixture of lead ore on the south wall, about 18 in. wide, and thus proving what has been frequently reported by him, as well as myself, that for the last 70 fathoms we have been traversing over, and in close proximity to, an immense body of rich silver-lead ore. If this had not been found we should probably hear some croakers calling us false prophets, and although I do not myself claim any pretensions to foresight, I like to give publicity to honour where honour is due, and a due mede of praise to one who so richly deserves it. All that is wanted now is a good field of dressing machinery to put us into a first-class dividend-paying property, and one that must continue to be so, for the ground is practically inexhaustible for at least 50 years. We have here an illustration of what may be obtained in Cardiganshire, under good and judicious management, for a very small sum of money—a lasting mine of wealth to the fortunate proprietors. A. WILLIAMS.

Cwm Darren, Goginan, June 11.

FOREIGN MINING AND METALLURGY.

It seems not unlikely that the discovery of the process of dephosphorising iron, if it confers a benefit upon certain English iron districts by making ore not hitherto used in the production of steel available for that purpose, will also have the effect of increasing competition in the international steel market by greatly extending the area of cheap production. Already the process has been acquired for Belgium and Germany, and it is now stated that it is probably destined to have a marked influence on the Austrian iron industry. Should it be made available in Austria the groups of works in Styria and Corinthia will lose the special advantages which they at present enjoy, while the establishments in the north of the Empire, and notably in Bohemia and Moravia, which, in consequence of the extremely phosphoric character of the ore in their immediate vicinity, have been compelled to draw their material from Styria, will be enabled to dispense with the latter source of supply, and to produce large quantities of Bessemer steel cheaply from their own ore. With this expectation several of the more important establishments have decided to send experts to this country to study the new process, and specially to test the quality of the steel produced. We understand that representatives of the Withowitz Company, the Albrecht Works, and the Innerberg Works are already on their way for this purpose.

In the Belgian iron trade the situation has remained generally unaltered. Some current orders have maintained a certain activity in the works, but large transactions have been effected with difficulty, and it might almost be said that they are impossible, as producers are not very eager to hamper themselves with heavy contracts at the present reduced rates. The relatively good position of metallurgical industry in France—especially the Nord—has exerted a slight influence not upon prices, which remain very low, but upon the general condition of the market. It is a moral influence, but nothing more. Belgian industrials are still recognising the necessity of seeking with energy for fresh foreign outlets. The Italian Government has just exempted from taxation the materials required for the manufacture in Italy of rolling stock for the Palermo, Marsala, and Trapani Railway (Sicily). In consequence of this exemption, the Italian Government establishments of Pietrarsa and Granili have undertaken the delivery of ten locomotive tenders, 70 passenger carriages, and 110 goods trucks. The Athus Works have forwarded large quantities of pig into Germany during the last few weeks in order to elude new customs tariffs recently decreed.

No appreciable change has occurred in the Belgian coal markets. Transactions have been carried through with some difficulty, and the prices obtained have been comparatively unremunerative. For domestic coal there has been little or no demand, but this was only to be expected with the advent of summer, and it is right to remark that the late severe winter has had the effect of bringing about a considerable reduction of stocks. As regards industrial coal, it must be said to be rather pressed for sale, in consequence of the foreign competition which has to be sustained, and in consequence also of the unfavourable conditions upon which the iron and glass works are carrying on their operations. Contracts are about to be let at Ostend for about 8000 tons of coal, required for the Belgian navy during the second half of 1879.

The Paris coal market has presented few features of special interest. The demand for house coal has, of course, somewhat declined, but there has been rather more inquiry for coal for industrial purposes, although there has been no improvement in prices. In the Nord and in the Pas-de-Calais work has been resumed in all the coal mining districts upon the same conditions as before the strike. In the basin of the Loire the coal trade has presented few features of interest.

The Belmez Colliery and Metallurgical Company has a balance of 20,551*l.* available for dividend in respect of profits realised during 1878. The dividend for the past year has been fixed at 8 per cent. per annum. Of this dividend 6 per cent. will be paid July 1, and 2 per cent. Jan. 1, 1880.

The improvement in the iron trade in the French department of the Haute-Marne has become more sensible, and orders have come to hand more regularly. Besides the re-establishment of a scale of 8*s.* per ton per class, the basis price of iron has been raised. One rather important company has carried No. 2 rolled iron to 6*l.* 16*s.* per ton; mixed iron (No. 3), to 7*l.* 12*s.* per ton; ordinary charcoal-made iron (No. 4), to 8*l.* 8*s.* per ton; and special iron, first category, to 7*l.* 4*s.* per ton. In the Nord merchants' iron has been maintained at 6*l.* 12*s.* per ton. There has been some revival in plates in the Loire-et-Rhone. Merchants' iron has also been more sought after, and transactions have been passibly active, but as regards plates prices have remained stationary.

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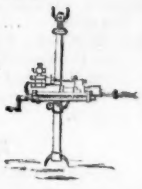

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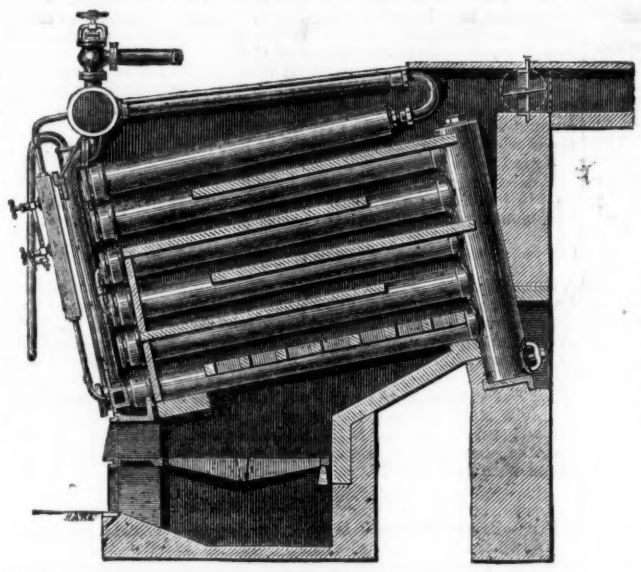

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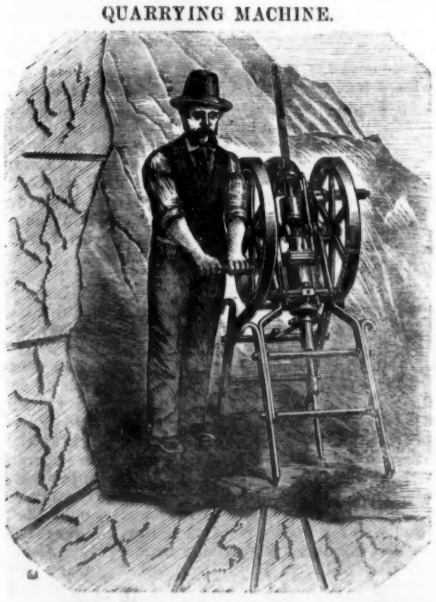

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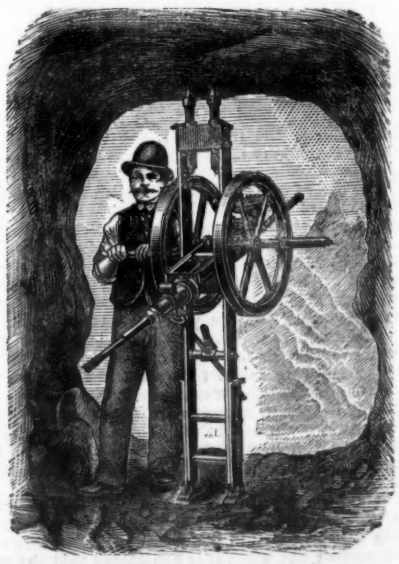

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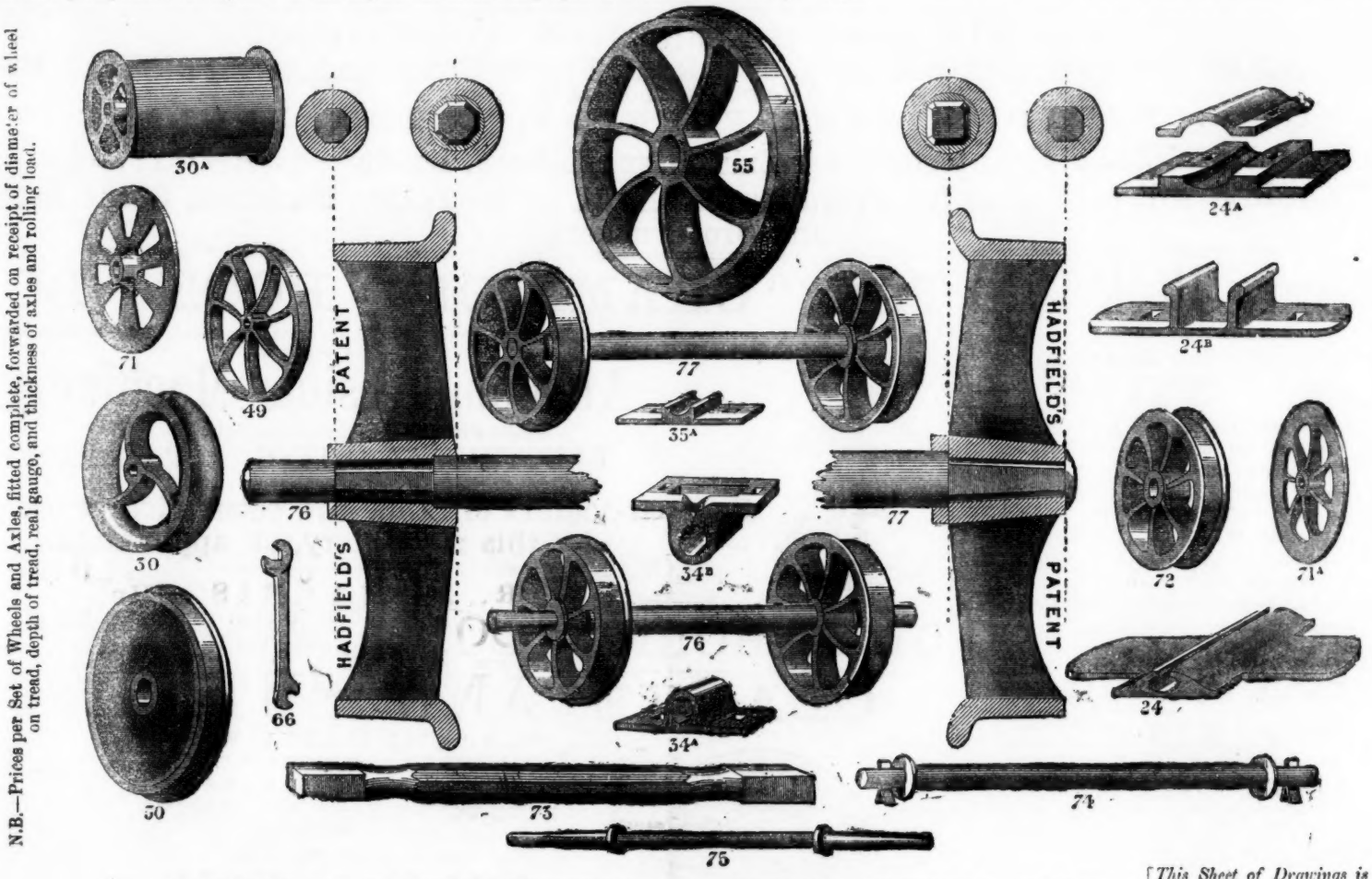

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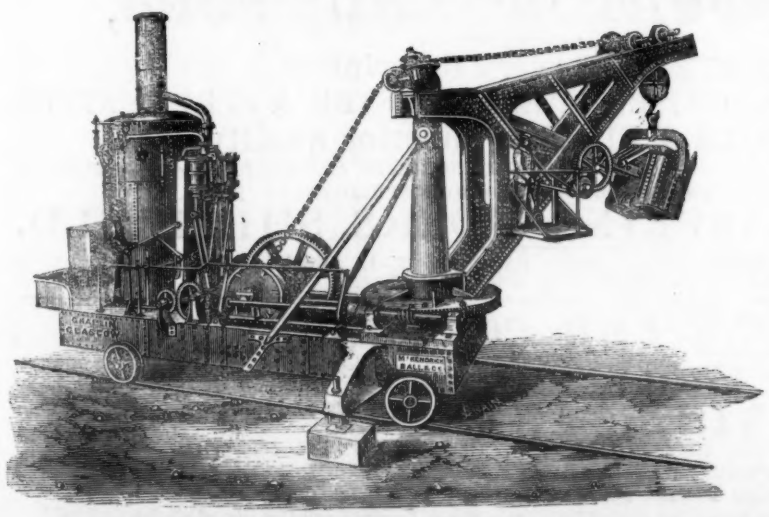

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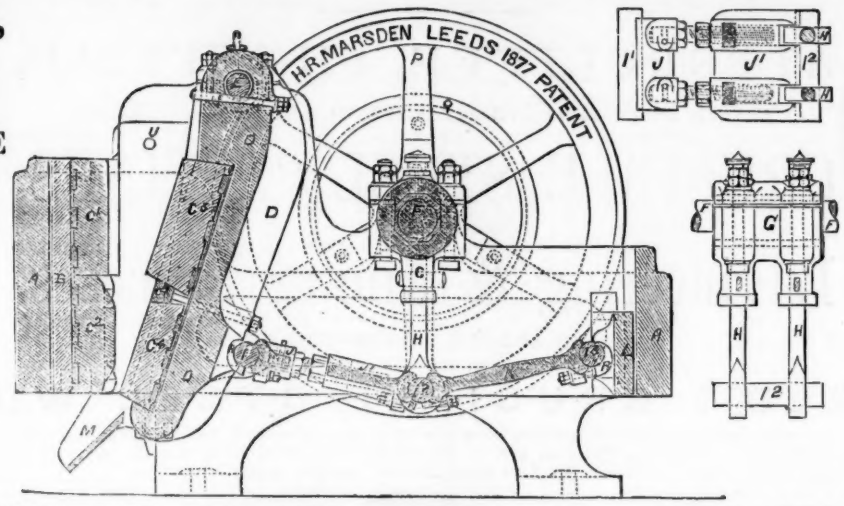

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H. E. MARSDEN, Esq., Soho Foundry, Meadow-lane, Leeds.

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I am, dear Sir, yours very truly,
WILLIAM MILLER.

AND THIS—

Wharthole Lime Works, Aspatria, Cumberland, July 11th, 1878.

H. R. MARSDEN, Esq., Soho Foundry, Leeds.

DEAR SIR,—We are in receipt of your letter of 4th inst. I may just state that the stone breaker above named has been under my personal superintendence since its erection, and I have no hesitation in saying that it is as good now as it was five years ago.

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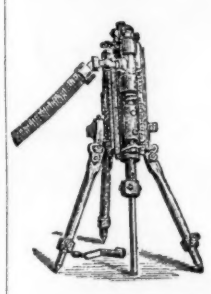

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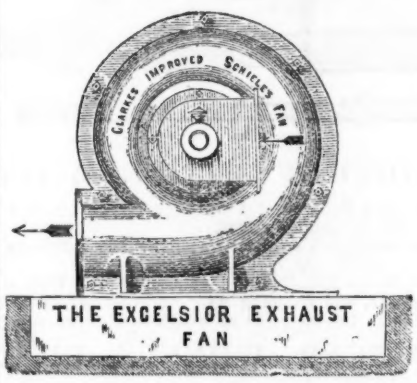

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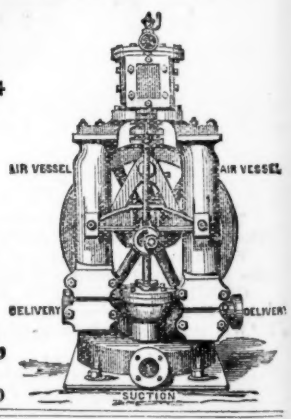

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